Cloud Computing: A potential paradigm for practising the scholarship of teaching and learning

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The road to success is always under construction.

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Abstract

Advances in technology offer new opportunities in enhancing teaching and learning. Many advances in learning technologies are taking place throughout the world. The new technologies enable individuals to personalise the environment in which they work or learn, utilising a range of tools to meet their interests and needs. In this fairly short theoretical paper, we explore the salient features of digital scholarship (DS), and the nature and educational potential of 'cloud computing' (CC) in order to exploit the affordance of CC in advancing the scholarship of teaching and learning in a higher education context. In the paper we argue that the cloud computing has a significant place in the higher education landscape both as a ubiquitous computing tool and a powerful platform that can enhance engagement among educators to understand and improve practice, and thus, increase productivity. Specific cloud tools considered in this paper are the Google Docs and Microsoft's SkyDrive. A simulation module will be presented to demonstrate how these tools could be effectively utilised in augmenting our claims in this paper. By critically examining the utility of these two tools, we find that they are user-friendly media which can be used as a personal digital workspace as well as for storage for digital artefacts. Such artefacts stored in the "cloud" can be accessed from anywhere at anytime, and can be easily shared with others. It is worth trying its use by academics for sharing tested-and-tried teaching materials, artefacts, portfolios, strategies, and research outcomes (on how they have made learning possible with focus on issues around "What's possible?" "What worked?", "What did not work?", "What are the conditions under which learning occurs?", etc.), and all these, with an eye not only to improving their own classroom but to advancing practice beyond it. As a result, the purpose is to raise awareness among those educators who are not familiar with the potential of CC in providing a platform for active collaboration which is critical to promote the ideals of DS for one's professional development and be successful in their profession.

Introduction: Issues and Challenges in Higher Education

Higher education (HE) landscape around the world is in a constant state of flux and evolution, mainly as a result of significant challenges arising from efforts in adopting new and emerging technologies and pedagogies in their teaching and learning environments. This is mainly as a result of a new genre of students with learning needs vastly different from their predecessors, and it is increasingly recognised that using technology effectively in higher education is essential to providing high quality education and preparing students for the challenges of the 21st century. However, an unresolved challenge to the effective use of technology in education is *the continued dominance of traditional didactic pedagogy despite the* critical need for a paradigm shift from the passive teacher-

centred approach (transmission of information and skills) to student-centred constructivists approaches whereby students construct knowledge through interaction and collaboration with peers as well as teachers. The bulk of today's elearning systems still consist of simple conversion of classroom-based content to an electronic format while still retaining its traditional distinctive knowledge-centric nature (Teo et al. 2006).

Although the new technologies have the potential to play an important role in the development and emergence of new pedagogies, where control can shift from the teacher to an increasingly more autonomous learner, and to rescue the HE from this appalling situation, the change is very slow or not forthcoming at all for various reasons. This is mainly because both teachers and learners require a number of specific skills for technology-supported constructivist approaches that is, online tutor skills, and online learning skills; learners get limited support to develop such skills from their teachers who often lack these same skills themselves. This scenario is not only in developing countries, but also widespread in developed countries. Based on a UK-based study, Twigg (2003) reports, "Unfortunately, the likelihood that their adoption of new technologies would foster innovative pedagogy is slim (Twigg, 2003). After analysing the state of technology use in HE at Stanford University in USA, Cuban (2001) concluded, "Dominant teaching practices remained largely constant in the years of greatest penetration of new technologies". As a result, teaching is more a private interaction between the teacher and his/her own students, and is seldom evaluated by peers or any other reviewers for effectiveness.

It is becoming clear to many people, including students, that traditional methods are unable to address the needs of HE where the emphasis is on higher order learning experiences and outcomes demanded of a changing knowledge- and communication-based society. The rapid advances in technology in the last few decades have had a significant impact on work, leisure, culture and social interaction. The kind of skills students need to develop to be prepared for the jobs of the 21st century is different from what they needed 20 years ago. Therefore, it is not an option but is a necessity the move beyond our comfort zones towards adopting constructivist approaches that can better equip our student for the needs of the 21st century. It is hoped that this move can be effectively facilitated by adopting the ideals of the SoTL through innovative research approaches that befit the digital age in ways it is conducted, conveyed, and shared among colleagues and the public, and how it is integrated into one's own teaching to achieve a new level of efficiency and effectiveness.

Scholarship of Teaching and Learning (SoTL)

It is becoming increasing evident that teaching should no more be a private affair (as it used to be traditionally) but a peer-reviewed transparent process that makes it known what makes learning possible and how student learning can be improved generally. An ideal model of the SoTL offers a framework for peer review and making transparent the processes of making learning possible, not only in one's own classroom but even beyond it. Lee Shulman and Pat Hutchings (1999) contend that the scholarship of teaching "requires a kind of 'going meta,' in which faculty frame and systemically investigate questions related to student learning—the conditions under which it occurs, what it looks like, how to deepen it, and so forth—and do so with an eye not only to improving their own classroom but to advancing practice beyond it." The salient attributes of SoTL are:

- Teaching as well as its development is done *publicly* to invite critical review in order to improve teaching but also with an emphasis on inquiry into student learning;

- *Peer review* and evaluation of teaching and its development; peer review enhances the dialogue related to teaching effectiveness, course content, pedagogical methods, and assessment strategies;
- *Adoption by peers* through further development or modification or even as it is in an atmosphere of intellectual openness which is a recognition of the appropriateness of one's approaches;
- Investigation of questions related to student learning, particularly around issues of student learning—the conditions under which it occurs, what it looks like, how to deepen it, and so forth—with a view to improving not only their own classroom but also to advancing practice beyond it.

I argue that substantial pedagogical innovations in HE will not come unless there is a proper understanding of the processes of SoTL, a positive mindset towards a culture of the SoTL and the adoption of its ideals by teachers in HE. The understanding that should precede adoption should be deep enough to bring about change in teachers' beliefs about what constitutes knowledge and learning in HE settings, and further, what means to be 'educated' in the 21st century. This is an essential catalyst for educational change to occur. Fosnot (1996) reports:

> If there is a key to reinventing our educational system, it lies in what our teachers believe about the nature of knowing. Without a re-examination and change in beliefs about the nature of knowing, there will be no substantial change in the enterprise of education; we will stay in a vicious cycle. (p. 202)

The new epistemological beliefs – constructivism and SoTL—must then be incorporated into the teaching practice. By constructivist belief, the emphasis is on learner-centred teaching and learning environments that is nurtured/ supported by the affordances of emerging communication technologies. In this paper the focus is on SoTL. By the principles of SoTL, the success in aligning our classroom practice depends largely on our individual efforts, and our ongoing dialogue with colleagues who may have done it successfully before or who are struggling with the same transformation. Collaborative dialogue and communication within a community connect minds, either directly or indirectly, engenders deep thinking and fosters cross fertilisation of ideas. Hutchings (Carnegie Foundation, 2000) presented the following taxonomy of questions teachers can pose in such collaborative environments for inquiry into student learning.

- "What works?" – These are questions that seek "evidence about the relative effectiveness of different approaches".
- "What is?" – These are questions that seek to describe how students learn, and accordingly, describe different teaching strategies;
- "Visions of the possible" – These are questions related to goals for teaching and learning that have yet to be achieved or are new to the teacher asking the questions.
- "Theory building" questions – These are questions designed to build theoretical frameworks for SoTL.

By and large, the overall SoTL approach is similar to 'development research' as articulated by Van den Akker (1999) or 'design experiments' as defined by Brown (1992) and Collins (1992).

Brown and Collins defined the critical characteristics of design experiments as:

- addressing complex problems in real contexts in collaboration with practitioners,
- integrating known and hypothetical design principles with technological affordances to render plausible solutions to these complex problems, and
- conducting rigorous and reflective inquiry to test and refine innovative learning environments as well as to define new design principles.

Development research design is appropriate when the intervention is implemented to address a need. Van den Akker (1999) clarifies a few steps of development research design:

> In the search for innovative 'solutions' for educational problems, interaction with practitioners... is essential. …. is it possible to create a practical and effective intervention for an existing problem or intended change in the real world? …. Interaction with practitioners is needed to gradually clarify both the problem at stake and the characteristics of its potential solution. An iterative process of 'successive approximation' or 'evolutionary prototyping' of the 'ideal' intervention is desirable. Direct application of theory is not sufficient to solve those complicated problems. (pp. 8-9)

For most teachers, SoTL is an uncharted territory; technology can greatly facilitate and advance the SoTL. More than ever before, there is an urgent need for more and better research through increased active collaboration among teachers in order to optimise their roles and expertises. Active collaboration among teachers is no longer an option, but a *must* for their success as teachers; further, it has a growing positive impact on the intellectual life of their institutions. It is even crucial for the survival of HE institutions when they are ranked based on the extent of its online presence as a provider of quality education.

What is cloud computing?

Although the concept of "cloud computing" has been around for over a decade, the terminology is only lately gaining popular traction. Technical aspects of cloud computing is certainly out of the scope of this paper. However, it is essential to provide certain salient features that are relevant to academics. The concept of "computing in the cloud" is about the delivery of IT services that run in a web browser; the type of services range from adaptations of familiar tools such as email and personal finance to new offerings such as virtual worlds and social networks. Storage of digital data is an important service among these.

Cloud computing is a computing platform that resides in a service provider's large data centre and is able to dynamically provide servers the ability to address a wide range of needs of clients. The *cloud* is a metaphor for the internet. Some people call it the World Wide Computer. Technically, it is a computing paradigm in which tasks are assigned to a combination of connections, software and services accessed over a network. This network of servers and connections is collectively known as *the cloud*. Physically, the resource may sit on a bunch of servers at different data centres or even span across continents. Actually, it is designed to work like a whole computer in the cloud and aimed at a wider audience, including those who can't afford their own computer. Computing at the scale of the cloud allows users to access supercomputer-level power. Instead of operating their own data centres, firms might rent computing power and storage capacity from a service provider, paying only for what they use, as they do with electricity or water. This paradigm has also been referred to as "utility computing," in which computing capacity is treated like any other metered utility service—one pays only for what one uses. Users can reach into the cloud for resources as they need from anywhere at anytime. For this reason, cloud computing has also been described as "on-demand computing."

Some of the providers of cloud computing service are the Google, Amazon, Salesforce, and Microsoft. Microsoft's Windows Live software suite includes an updated electronic mail program, a photo-sharing application, a writing tool designed for people who keep Web logs and SkyDrive for online data storage and FolderShare services. Google, took cloud computing a step further by offering a suite of free word-processing and spreadsheet software over a

browser. Google Apps, Maps and Gmail are all based in the cloud. Screenshots to demonstrate the affordances of Google Docs and Windows Live are included in the Appendix.

As academics, what we are most interested in is its networked data storage capability. This paper explores its potential for storage and dissemination of intellectual work in the form of digital scholarship to other members of the professional community such that they can, in turn, peer-review, critique, and further, build up on it.

The typical uses of cloud computing to academics are:

- It can be used as a personal workspace;
- A convenient tool to engage in the scholarship of teaching and learning;
- Personal Learning Environments (PLEs) used by many people as an alternative to institutionally controlled Virtual Learning Environments (VLEs)/LMS with different personalised tools to meet their own personal needs and preferences; as teachers we are always learning;
- Provides opportunity for ubiquitous computing;
- No need for backing up everything to a thumb drive and transferring it from one device to another;
- No need to copy all stuff from one PC to another when buying a new one. It also means you can create a repository of information that stays with you and keeps growing as long as you want them;
- Provides large amounts of processing power comparable to supercomputer level;

However, the cloud raises some thorny issues about who controls clients' data. Besides, it raises a range of important policy issues, which include issues of privacy, security, anonymity, telecommunications capacity, government surveillance, reliability, and liability, among others. These will have to be worked out for the cloud to gain popularity and wide acceptance.

Practical application of cloud computing in HE

Cloud concept has significant implications as a communication medium. While it may not be highly interactive in a physical sense, it has strong potential for social interactivity. The goal of utilising this type of tool is the achievement of 'virtual communities' of educators, researchers and practitioners on the Internet working in small collaborative groups which may help to promote a more reflective metacongitive approach in tackling problems and advancing the practices.

In order to succeed in research projects and to develop quality work through iterative processes, the role of active collaboration with colleagues and experts in the field at its various stages of development cannot be overemphasised. Stages in research projects are mainly: *Setting Research Theme*, *Discussion and Collaboration*, *System Development*, and *Presentation and Publishing*. The 'cloud computing' provides an easy user-friendly environment / platform for this type of collaboration.

The cloud platform can support teachers to prepare teaching portfolio; presentation on teaching to a local audience; a conference presentation; a manuscript to be submitted for publication, etc. It may also include, for the purpose of critical review and evaluation, self-reported ePortfolios that summarise a teacher's major teaching accomplishments and strengths in the form of short descriptions of activities and achievements (e.g., what and how they teach–types of instructional methods, materials, and techniques, why they teach that way, and whether or not it works with evidences), feedback from peers based on teaching observation and peer review of related scholarly activities, feedback from students based on their views on instructional activities, and the end-of-course student evaluation instrument.

Summary

The paper describes the salient features of the SoTL and discusses how the educational potential of 'cloud computing' may be utilised for advancing the much needed practice of collaboration among educators, and achieving the ideals of SoTL. I argue that the cloud computing has a significant place in the higher education landscape both as a ubiquitous computing tool and a powerful platform that can enhance engagement among educators to understand and improve practice, and thus, increase productivity. Specific cloud tools considered in this paper are the Google Docs and Microsoft's SkyDrive. By critically examining the features of the Google Docs and Microsoft's SkyDrive, I find that they are user-friendly media which can be used as a personal digital workspace as well as for storage for digital artefacts that can be accessed or easily shared with others anywhere at anytime. It is worth trying its use by academics for sharing tested-and-tried teaching strategies and materials, and to promote the ideals of SoTL for one's professional development and be successful in their profession.

References

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2(2), 141-178.

Cuban, L. (2001). *Oversold and underused: computers in the classroom*. Cambridge, Massachusetts: Harvard University Press.

Collins, A. (1992). Towards a design science of education. In E. Scanlon & T. O'Shea (Eds.), *New directions in educational technology* (pp. 15-22). Berlin: Springer.

Fosnot, C. (1996) *Constructivism: Theory, perspectives, and practice*. New York: Teachers College Press.

Hutchings, P., and Shulman, L. S. (1999). The Scholarship of Teaching: New Elaborations, New Developments. *Change*, 31 (5). Pp 10-15.

Teo, C. B., Chang, S. C. A., & Leng, R. G. K (2006). Pedagogy Considerations for E-learning. Retrieved 10 Oct 2008 from http://www.itdl.org/Journal/May_06/article01.htm

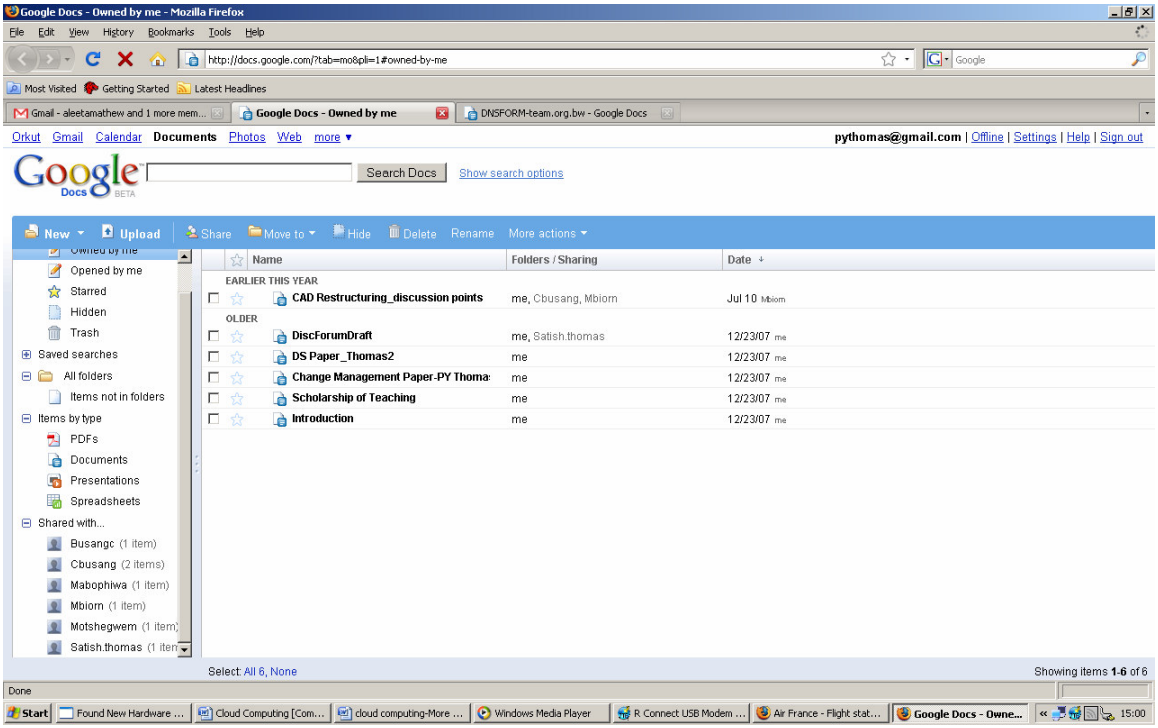
Twigg, C. A. (2003). *Improving Learning and Reducing Costs: Lessons Learned from Round I of the Pew Grant Program in Course Redesign*. Center for Academic Transformation, Rensselaer Polytechnic Institute. Toy: NY.

Van Den Akker, J. (1999). Principles and methods of development research. In J. van den Akker, N. Nieveen, R. M. Branch, K. L. Gustafson, & T. Plomp, (Eds.), *Design methodology and developmental research in education and training (*pp. 1-14). The Netherlands: Kluwer Academic Publishers.

Appendix

Screen shots

1) Google Doc



2) Microsoft Live